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DERIVATION OF THE FORMULA ON P. 96, VOL. III, viz.;

$$R = r \times \frac{(n+1)N + (n-1)r^n}{(n-1)N + (n+1)r^n},$$

where r is an approximate value of $\sqrt[n]{N}$ and R a much nearer approxima'n.

Let $N = r^n + a$, then, by the binomial formula,

$$N^{\frac{1}{n}} = r \left(1 + \frac{a}{nr^n} - \frac{(n-1)a^2}{1.2.n^2r^{2n}} + \frac{(n-1)(2n-1)a^3}{1.2.3.n^3r^{3n}} - \text{etc.} \right).$$

Beginning with the term $a \div nr^n$ and reducing to a continued fraction and stopping at the second term of the cont'd fract. gives approximately

$$\frac{\frac{a}{nr^n} - \frac{(n-1)a^2}{1.2.n^2r^{2n}} + \text{etc.}}{1} = \frac{1}{\frac{nr^n}{a} + \frac{1}{\frac{2}{n-1} + \text{etc.}}} = \frac{2a}{2nr^n + (n-1)a};$$

$$\therefore R = r \left(1 + \frac{2a}{2nr^n + (n-1)a} \right) = \frac{2nr^n + (n+1)a}{2nr^n + (n-1)a}.$$

Substituting for a its value $= N - r^n$,

$$R = r \times \frac{(n+1)N + (n-1)r^n}{(n-1)N + (n+1)r^n} = N^{\frac{1}{n}} \text{ nearly.}$$

R. J. ADCOCK.

SOLUTIONS OF PROBLEMS IN NUMBER SIX, VOL. IX.

SOLUTIONS of problems in No. 6, Vol. IX, have been received as follows:

From Florian Cajori, 422; Geo. E. Curtis, 419, 421; Prof. H. T. Eddy, 420; Geo. Eastwood, 422; Prof. A. Hall, 420; Henry Heaton, 419, 420, 422; Charles V. Kerr, 419; E. H. Moore, Jr., 419, 422; Levi W. Meech, 418; Thos. Spencer, 419; M. Updegraff, 419.

Prof. J. W. Nicholson sent elegant solutions of prob's 411 and 416, but his letter was accidentally misplaced, hence they were not included in notice of solutions in No. 6.

418. By Levi W. Meech, A. M., Norwich, Conn.—“Required to express Lagrange's Theorem in terms of Finite Differences, as far as practicable, instead of the usual differentials.”

SOLUTION BY THE PROPOSER.

Let θ denote an auxiliary, such that Lagrange's Theorem may take the form of the definite integral: